REMARKS/ARGUMENTS

Status of Claims

Claims 1-30, 34-36 have been cancelled.

Claims 31, 32, 33 and 37 remain cancelled.

Claims 38-54 are new.

Support for new independent claims 38, 45, 47, 49, 52, 53, and 54 is provided at least at page 7, lines 12-18; at page 9, line 5 to page 11, line 8; at page 11, line 9 to page 13, line 18; at page 13, line 27 to page 14, line 11; at page 15, line 14 to page 16, line 13; at page 19, line 21 to page 25, line 10; at page 24, lines 16-24; and in the descriptions with reference to Figure 1 to 3.

For the easy reference of the Examiner, the following table shows concordance of the new dependent claims and their relationship to the cancelled dependent claims.

New Dependent Claims	Cancelled Dependent Claims
39	5
40-41	9-10
42	14
43	15
44	20-23
46	25
48	27
50	29
51	30

35 U.S.C. § 101 Rejection

In paragraphs 2-3 of the Office Action, the Examiner has objected to cancelled claims 1-5, 9-10, 14-15 and 19-23 under 35 U.S.C. § 101 as not having a patent-eligible subject matter. Cancelled claims 1-5, 9-10, 14-15 and 19-23 correspond to new claims 38 and 39-44. Specifically, the Examiner has stated that these claims do not qualify as a statutory process because they fail to be tied to another statutory category (such as a particular apparatus) or transform underlying subject matter (such as article or material) to a different state or thing.

Applicant respectfully submits that new claim 38 and claims 39-44 which depend thereon, recite a process transforming data representative of an underlying physical object into a different state, thus imposing meaningful limits on its scope to impart patent-eligibility.

In *re Bilski*, 545 F.3d 943 (C.A.Fed., 2008), the Federal Circuit laid down the law of subject matter eligibility under Section 101 of the Patent Act. To be patent eligible, a claimed process must either: (1) be tied to a particular machine or apparatus, or (2) transform a particular article into a different state or thing. The Court stated the following:

> *Neither the PTO nor the courts may pay short shrift to the machine-or-transformation test by using purported equivalents or shortcuts such as a "technological arts" requirement. Rather, the machine-or-transformation test is the only applicable test and must be applied, in light of the guidance provided by the Supreme Court and this court, when evaluating the patent-eligibility of process claims."*
>
> *"The machine-or-transformation test is a two-branched inquiry; an applicant may show that a process claim satisfies § 101 either by showing that his claim is tied to a particular machine, or by showing that his claim transforms an article. See Benson, 409 U.S. at 70, 93 S.Ct. 253. Certain considerations are applicable to analysis under either branch. First, as illustrated by Benson and discussed below, the use of a specific machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility. See Benson, 409 U.S. at 71-72, 93 S.Ct. 253. Second, the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity. See Flook, 437 U.S. at 590, 98 S.Ct. 2522.*

Further, the Bilski Court discussed "what sort of things constitute articles such that their transformation is sufficient to impart patent-eligibility under § 101." Besides a chemical or physical

transformation of physical objects or substance, by citing *Abele*, 684 F.2d at 909, the Court stated that the electronic transformation of data representing physical and tangible objects is also within the boundaries of what constitutes patent-eligible transformation of articles:

> *"We further note for clarity that the electronic transformation of the data itself into a visual depiction in Abele was sufficient; the claim was not required to involve any transformation of the underlying physical object that the data represented. We believe this is faithful to the concern the Supreme Court articulated as the basis for the machine-or-transformation test, namely the prevention of pre-emption of fundamental principles. So long as the claimed process is limited to a practical application of a fundamental principle to transform specific data, and the claim is limited to a visual depiction that represents specific physical objects or substances, there is no danger that the scope of the claim would wholly pre-empt all uses of the principle."*

Nevertheless, the Bilski Court also discussed a number of situations where a transformation or a tie to a particular apparatus is not sufficient to make a process patent-eligible. The Court said that "adding a data-gathering step to an algorithm is insufficient to convert that algorithm into a patent-eligible process." The Court also illustrated the following example.

> *We have in fact consistently rejected claims like those in the present appeal and in Comiskey. For example, in Meyer, the applicant sought to patent a method of diagnosing the location of a malfunction in an unspecified multi-component system that assigned a numerical value, a "factor," to each component and updated that value based on diagnostic tests of each component. 688 F.2d at 792-93. The locations of any malfunctions could thus be deduced from reviewing these "factors." The diagnostic tests were not identified, and the "factors" were not tied to any particular measurement; indeed they could be arbitrary. Id. at 790. We held that the claim was effectively drawn only to "a mathematical algorithm representing a mental process," and we affirmed the PTO's rejection on § 101 grounds. Id. at 796. No machine was recited in the claim, and the only potential "transformation" was of the disembodied "factors" from one number to another. Thus, the claim effectively sought to pre-empt the fundamental mental process of diagnosing the location of a malfunction in a system by noticing that the condition of a particular component had changed.*

Similarly, the Supreme Court in *Parker v. Flook*, 437 U.S. 584 (St. Ct. 1978) rejected a process claim calculating an "alarm limit", a value that would indicate an abnormal condition during an unspecified chemical reaction for it is drawn to the formula itself. The court said:

> *The patent application does not purport to explain how to select the appropriate margin of safety, the weighting factor, or any of the other variables. Nor does it*

purport to contain any disclosure relating to the chemical processes at work, the monitoring of process variables, or the means of setting off an alarm or adjusting an alarm system. All that it provides is a formula for computing an updated alarm limit.

Applicant submits that, like *Abele* and unlike *Meyer* or *Parker v. Flook*, there is a patent-eligible transformation of an article in new claims 38-44. Specifically, the claimed process involves a transformation of a performance matrix representative of an optical signal path comprising a plurality of nodes interconnected by optical fiber segments. This performance matrix represents accumulated interference effects introduced by every node and segment as a wavelength signal passes through the signal path. The performance matrix is transformed from a state representing the interference effects at the start when the signal enters into the path, into a different state representing the interference effects at the end when the signal reaches the receiver node.

This is akin to the electronic transformation of data representing physical and tangible object in *Abele*. As with *Abele*, there is no need to involve a transformation of the underlying physical object that the data represents.

In view of the foregoing, Applicant submits that new claim 38, upon which new claims 39-44 depend on, qualifies as a statutory process, thus reconsideration and withdrawal of the rejection under 35 U.S.C. § 101 be respectfully requested.

35 U.S.C. § 112 Rejections

In paragraph 5 of the Office Action, cancelled claims 1-5, 9-10, 14-15 and 19-23 have been rejected under 35 U.S.C. § 112 as failing to comply with the written description requirement. Specifically, the limitations recited in cancelled claim 1, 2 and 14 have been objected by the Examiner.

As a preliminary matter, claim 2 has been cancelled, and the limitation objected to by the Examiner in that claim does not appear in the new claim set. Thus, the Examiner's objection to cancelled claim 2 is moot.

The Examiner has objected to the following limitation recited in cancelled claim 1 "identifying at least one dominant source which impacts each identified optical effect; identifying at least one base variable upon which each identified dominant source depends". This limitation now appears in new claims 38, 45, 47, 49 and 52-54.

The Examiner has objected to the following limitation recited in cancelled claim 14 "wherein the at least one identified optical effect is a noise effect". This limitation now appears in new claim 42.

Applicant respectfully submits that the Examiner misread the specification to the effect that dispersion, self-phase modulation, cross-phase modulation and four-wave mixing impact noise. However, the specification makes it clear that dominant sources that impact noise are amplified spontaneous emission, stimulated Brillouin scattering, stimulated Raman scattering and multi-path interference. By contrast, dominant sources as dispersion, self-phase modulation, cross-phase modulation and four-wave mixing only impact distortion. Support is provided in the description as follows:

> *Advantageously, certain optical effects, such as dispersion, self-phase modulation, cross-phase modulation and four-wave mixing, are identified as dominating the overall distortive impact on the signal. Noise effects, such as amplified spontaneous emission, stimulated Brillouin scattering, stimulated Raman scattering and multi-path interference are also identified.* (Page 7, lines 21-27)

> *It is known that, for certain system, dispersion, self-phase modulation, cross-phase modulation and four-wave mixing effects dominant the overall signal distortion. Different systems will exhibit different dominant effects.* (Page 11, lines 9-12)

> *It is also known that there are a number of noise effects that may be experienced by an optical signal, each of which will degrade the signal performance to one degree to another. There include amplified spontaneous emission, Stimulated Brillouin*

Scattering, Stimulated Raman Scattering and multi-path interference. (Page 12, lines 12-17)

The distortion metric Dx may generally be expressed as follows:

$$Dx = [DISPx\sim(A,B,C,D),\ SPMx\sim(A,B,C,D),\ XPMx\sim(A,B,C,D),\ FWMx\sim(A,B,C,D)] \quad (2)$$" (Page 15, lines 23-29)

The noise metric Nx may generally be expressed as follows:

$$Nx = [ASEx\sim(A,B,C,D),\ SBSx\sim(A,B,C,D),\ SRSx\sim(A,B,C,D),\ MPIx\sim(A,B,C,D)] \quad (3)$$" (Page 16, lines 1-6)

In view of the foregoing, Applicant respectfully submits that new claims 38, 42, 45, 47, 49 and 52-53 contain subject matter described in the specification in such a way as to reasonably convey to one skilled in the art in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In paragraph 6 of the Office Action, claims 1-5, 9-10, 14-15, 19-30 and 34-36 are rejected under 35 U.S.C. § 112 as failing to comply with the enablement requirement.

Claim 1-5, 9-10, 14-15, 19-30 and 34-36 have been cancelled, and none of the new claims include any of the specific limitations objected by the Examiner.

It is noted that the Examiner has objected to the limitation "a comparator to determine if the resulting performance of the signal at the end of the signal path satisfies an acceptable threshold" recited in cancelled claim 24. This objected limitation appears in new claim 45, though in slightly different form. Applicant directs the Examiner's attention to the following statement on page 14,

lines 8-11 of the specification:

> *Whatever performance metric is used, signal viability is indicated if, at the receiver end, the wavelength has a performance that exceeds a pre-determined acceptable threshold.*

Applicant submits that a person skilled in the art, on reading the above text will understand and appreciate how to enable a comparator for determining if the resulting value of the performance matrix satisfies an acceptable threshold to determine the viability of the signal path.

For at least the same reason, the objected limitation "determine if the resulting performance of the signal at the end of the signal path satisfies an acceptable threshold", recited in cancelled claim 34 and now appearing in slightly different form in new claims 52, conforms to enablement requirement under 35 U.S.C. § 112.

Applicant also notes that the limitation objected to by the Examiner of "a communicator for communicating the resulting performance value along the at least one downstream segment to the corresponding downstream node", recited in cancelled claim 26, now appears in slightly different form in new claims 47 and 49. Furthermore, Applicant notes that the limitation objected to by the Examiner of "a receiver for receiving a previous performance value from the at least one upstream node along the segment interconnecting the two nodes", recited in cancelled claim 28, now appears in new claims 45 and 49 in slightly different form.

Applicant submits that the descriptions with reference to Figure 1 will enable a person skilled in the art to make a communicator and a receiver having the features recited in the above-mentioned limitations. Specifically, Figure 1 illustrates how the value of a performance matrix is recalculated along a wavelength path when a signal passes from a transmitter node to a receiver node through a plurality of intermediate nodes. By reading the specification as a whole with the aid of this illustration, a person skilled in the art will immediately understand and appreciate how to make a communicator and a receiver operating in a communication network illustrated in Figure 1.

For at least the same reason, Applicant submits that the limitation objected to by the Examiner of "receive a previous performance value from the at least one upstream node along the segment interconnecting the two nodes", recited in cancelled claim 36 and now appearing in new claims 52 and 54 in slightly different form, and the limitation "communicate the resulting performance value along with the at least one downstream segment to the corresponding downstream node", recited in cancelled claim 35 and now appearing in new claims 53 and 54 in slightly different form, conform to enablement requirement under 35 U.S.C. § 112.

In paragraphs 8-11 of the Office Action, the Examiner rejected claims 27 and 29-30 on the ground of indefiniteness.

Claims 27 and 29-30 have been cancelled rendering the Examiner's objection moot.

Thus Applicant request that all the rejections under 35 U.S.C. § 112 be respectfully reconsidered and withdrawn.

35 U.S.C. § 102 Rejections

In paragraphs 12-13 of the Office Action, claims 1-3, 5, 9-10, 14-15, 20, 24-26, 28 and 34-36 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 7,095,956 to Levandovsky et al. ("Levandowsky et al.")

Claims 1-3, 5, 9-10, 14-15, 20, 24-26, 28 and 34-36 have been cancelled. Further, Applicant respectfully submits that new claims 38-54 are not anticipated by Levandovsky et al.

New claim 38 reads:

1. A method for determining the viability of a signal path of a wavelength through a communication network, comprising:

defining a performance matrix by identifying at least one performance metric measuring interference effects on the wavelength along the signal path;

identifying a unidirectional path of the wavelength through a plurality of nodes interconnected by segments of optic fibre;

calculating an initial value of the performance matrix by analyzing interference effects on the wavelength;

for each of the plurality of nodes along the unidirectional path,

identifying an upstream segment on the unidirectional path, and recalculating a value of the performance matrix by analyzing interference effects on the wavelength in the upstream segment, and analyzing interference effects on the wavelength at the node; and

for each upstream segment connected to the node on the wavelength other than the upstream segment on the unidirectional path, recalculating the value of the performance matrix by identifying a transmitter node of the upstream segment on the wavelength, and analyzing interference effects on the wavelength while the signal passes through the transmitter node to the upstream segment;

at a receiver node, comparing the value of the performance matrix against an acceptable threshold to determine the viability of the signal path;

wherein analyzing interference effects on the wavelength comprises identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends. (emphasis added)

Applicant submits that Levandovsky et al. does not disclose the features recited in the underlined portion of the text.

Therefore, new claim 38, as well as new claims 39-44 which depend thereon, are not anticipated by Levandovsky et al. For at least the same reasons, the corresponding new apparatus and computer readable medium claims 45-51 and 52-54 are also novel in view of Levandovsky et al.

For view of the foregoing, Applicant respectfully submits that lack of novelty rejections under 35 U.S.C. § 102(e) be reconsidered and withdrawn.

35 U.S.C § 103 Claim Rejections

In paragraph 15 of the Office Action, the Examiner has objected to claim 4 as being unpatentable over Levandovsky et al. in view of U.S. Patent No. 7,190,902 to Solheim et al. ("Solheim et al.").

Claim 4 has been cancelled and the limitations of cancelled claim 4 do not appear in the new claim set.

In paragraph 16 of the Office Action, the Examiner has objected to claim 19 as being unpatenable over Levandovsky et al. in view of U.S. Patent No. 6,980,740 to Denkin et al.("Denkin et al.").

Claim 19 has been cancelled and the limitations of cancelled claim 19 do not appear in the new claim set.

In paragraph 17 of the Office Action, the Examiner has objected to claims 21-23 as being unpatenable over Levandovsky et al., and separately unpatentable over Levandowsky et al. in view of U.S. Patent No. 6,701,087 to Beine et al. ("Beine et al.").

Claims 21-23 have been cancelled. The limitations of cancelled claims 21-23 appear in new claim 44. New claim 44 depends on new claim 38.

As noted above in connection the argument submitted in respect of new claim 38, Levandovsky does not include the limitations underlined above. Beine et al. does not cure this deficiency in Levandowsky et al.

Therefore, Applicant respectfully submits that the new claims are not obvious. For at least the above reasons, Applicant respectfully submits that the obviousness objections under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

In view of the foregoing, early favourable consideration of this application is earnestly solicited.

Respectfully submitted,

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